IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Oren Arad et al.	CONFIRMATION NO.:	2628
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TITLE:	METHOD AND APPARATUS FOR DETERMINING CHANNEL TO WHICH A TV OR VCR IS TUNED		
EXAMINER:	Zhong, Jun Fei		
ART UNIT:	2623		

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APPEAL BRIEF

Dear Sir:

This paper is in support of a Notice to Appeal filed August 28, 2008, of the Office Action dated May 28, 2008, to the Board of Patent Appeals and Interferences.

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REAL PARTY IN INTEREST

Motorola, Inc.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 7-12 and 16-17 have been objected to.

Claims 1-6, 13-15 and 18-22 have been finally rejected and are on appeal.

STATUS OF AMENDMENTS

No amendments after final have been filed. All amendments have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention relates to a circuit for use with for example an analog TV set or a VCR (referred to generally as a TVR), enabling the analog TVR to tune to a digital information stream and select the desired channel from the digital information stream. The circuit automatically determines which channel has been selected by the analog TVR, maps this selected channel to a corresponding portion of the digital data stream, and extracts the selected channel from the digital data stream. The automatic determination of which channel has been selected is performed by sending out a probe signal to the TVR and measuring return loss in the reflected signal. The frequency at which return loss is greatest is a function of the frequency to which the tuner bandpass filter of the TVR has been tuned, which in turn is a function of the channel selected by the user. Accordingly, the return loss is used infer the selected channel and guide selection in the digital domain.

Claim 1 recites a return loss channel detector (16, FIG. 1; p. 7, ll. 7-8) apparatus comprising:

a directional coupler (24; FIG. 1; p. 7, l. 19) having an RF output (34; FIG. 1; p. 8, l. 8) for coupling to the RF input of an analog television or analog video tape recorder (hereafter TVR, 23; FIG. 1; p. 7, l. 18) and having a transmit input (31; FIG. 1; p. 7, l. 26) for receiving probe signals and a transmit output (36; FIG. 1; p. 8, l. 8) at which appear probe signals reflected from said TVR;

a multiplexer (26; FIG. 1; p. 7, l. 25) having an output coupled to said transmit input and having a first input for receiving a radio frequency carrier having a video signal modulated thereon and having a second input for receiving probe signals;

a transmitter (28; FIG. 1; p. 7, l. 24) for generating probe signals; and

a receiver (18; FIG. 1; p. 7, l. 29) for receiving reflected probe signals and calculating a return loss ratio therefrom.

Claim 13 recites a process (FIG. 3) for determining if an analog TV or VCR (hereafter TVR) is tuned to a particular TV channel, comprising the steps:

(1) generating one or more probe signals having frequencies within the passband or some of which are within and some of which are without the passband of a tunable bandpass filter within a tuner of a TVR when said TVR is tuned to a particular TV channel (46; FIG. 3; p. 9, ll. 21-23);

(2) transmitting said probe signals to an RF tuner input of said TVR and coupling reflected power back to an input of a receiver (46; FIG. 3; p. 9, ll. 24-26);

(3) in said receiver calculating a return loss ratio and determining therefrom whether said TVR is tuned to said particular TV channel (52; FIG. 3; p. 9, ll. 26-28).

Claim 18 recites a process for using return loss to verify a TV channel to which a TVR is tuned, comprising the steps:

1) detecting a local oscillator leakage signal and counting the frequency thereof and using said frequency to lookup a TV channel to which a TVR is tuned which would cause said local oscillator to have said frequency (68; FIG. 4);

2) generating and transmitting into an RF input of said TVR a plurality of probe signals having frequencies spread through a band of frequencies in which TV channels are transmitted (46; FIG. 4; p. 8, ll. 3-4);

3) determining the transmitted power of each probe signal (48; FIG. 4; p. 9, ll. 32-33);

4) measuring the reflected power of each probe signal (50; FIGS. 3 and 4);

5) calculating the return loss ratio for each probe signal (52; FIGS. 3 and 4; p. 9, ll. 26-28);

6) determining the probe signal with the maximum return loss (58; FIGS. 3 and 4; p. 10, ll. 21-23);

7) determine the TV channel whose frequency has the best match with the probe signal which suffered the highest return loss (68; FIGS. 3 and 4; p. 10, ll. 21-23);

8) determining if the TV channel determined in step 7 is the same as the TV channel determined in step 1 (68; FIG. 4; p. 14, ll. 11-13);

9) if step 8 determines the TV channels are different, use the TV channel determined in step 7 (68; FIG. 4; p. 14, ll. 11-13) and generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel determined in step 7 and recover the data thereof and convert said data to a television signal and modulate an RF carrier

having the frequency of the TV channel determined in step 7 with said television signal (70; FIG. 4);

10) if step 8 determines the TV channels are the same, use the TV channel determined in steps 7 and 1 and generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel determined in step 7 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 7 with said television signal (70; FIG. 4).

Claim 19 recites a process for using return loss to determine a TV channel to which a TVR is tuned, comprising the steps:

1) performing a setup process to learn the signature of each TV channel comprised of the return loss ratios of a plurality of probe signals which have frequencies spread throughout the TV channel band, and storing the signature for each TV channel (120; FIG. 6; p. 14, l. 1 – p. 15, l. 2);

2) determining the TV channel to which a TVR is currently tuned by performing the following steps:

3) generating a plurality of probe signals having frequencies which are spread through the band of frequencies in which TV channels are transmitted and transmitting said probe signals into the RF input of a tuner of a TVR (46; FIG. 3; p. 9, ll. 21-23);

4) calculating the return loss ratio on each probe signal (52; FIG. 3; p. 9, ll. 26-28);

5) comparing the collection of return loss ratios and comparing the collection of return loss ratios to the signature stored in memory for each TV channel and determining the TV channel have the least difference between its signature and said collection of return loss ratios calculated in step 4; and

6) generating suitable control signals to control a set top decoder to tune to a downstream channel carrying the TV channel determined in step 5 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 5 with said television signal (126; FIG. 6A; p. 15, ll. 8-10).

Claim 20 recites a setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) establishing the proper infrared protocol for at least channel change commands to be emitted from an infrared transmitter (134; FIG. 7; p. 16, ll. 21 – p. 17, l. 6);

2) entering a learning mode (136; FIG. 7; p. 17, ll. 6-9);

3) transmitting a channel change command from said infrared transmitter to cause a TVR connected to a set top decoder with a return loss ratio channel detection circuit therein to tune to a specific channel (138; FIG. 7; p. 17, ll. 9-11);

4) controlling said return loss ratio channel detection circuit to generate a plurality of probe signals and transmit them into the RF input of a tuner in said TVR (140; FIG. 7; p. 17, ll. 12-19);

5) measure the reflected amplitude of each said probe signal and calculate a return loss ratio therefor and store the collection of return loss ratios as a signature for the TV channel to which the TVR is currently tuned (140; FIG. 7; p. 17, ll. 12-19);

6) transmitting channel change command from said infrared transmitter to cause said TVR to change to a new channel (142; FIG. 7; p. 17, ll. 20-23);

7) repeating steps 4 and 5 for the new channel (144; FIG. 7; p. 17, ll. 23-25);

8) repeating steps 6 and 7 until a signature has been learned for every TV channel (144; FIG. 7; p. 17, ll. 23-25).

Claim 21 relates to a setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) establishing the proper infrared protocol for at least channel change commands to be emitted from an infrared transmitter in an external remote control for a set top decoder (STB), said external remote control including an RF transmitter for communicating with an RF receiver in said STB, said STB including a return loss ratio channel detection circuit therein having an RF output for coupling to the RF input of a tuner of a TVR (134; FIG. 7; p. 16, ll. 21 – p. 17, l. 6);

2) entering a learning mode (136; FIG. 7; p. 17, ll. 6-9);

3) transmitting a channel change command from said infrared transmitter in said external remote control to cause said TVR connected to said return loss ratio channel detection circuit to tune to a specific channel, and sending a radio frequency message to said STB telling said STB to which TV channel said TVR has just been tuned (138; FIG. 7; p. 17, ll. 9-11);

4) controlling said return loss ratio channel detection circuit to generate a plurality of probe signals and transmit them into said RF input of said tuner in said TVR (140; FIG. 7; p. 17, ll. 12-19);

5) measuring the reflected amplitude of each said probe signal and calculate a return loss ratio therefor and store the collection of return loss ratios as a signature for the TV channel to which the TVR is currently tuned (140; FIG. 7; p. 17, ll. 12-19);

6) transmitting channel change command from said infrared transmitter in said external remote control to cause said TVR to change to a new channel (142; FIG. 7; p. 17, ll. 20-23);

7) repeating steps 4 and 5 for the new channel (144; FIG. 7; p. 17, ll. 23-25);

8) repeating steps 6 and 7 until a signature has been learned for every TV channel (144; FIG. 7; p. 17, ll. 23-25).

Claim 22 relates to a setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) transmitting a channel change command to a TVR using a remote control of said TVR so as to tune said TVR to a selected TV channel (170; FIG. 10; p. 19, ll. 23-25);

2) periodically or occasionally monitoring leakage from a local oscillator in a tuner of said TVR to determine the frequency at which said local oscillator is oscillating (176; FIG. 10; p. 19, l. 30);

3) determining if the current frequency at which said local oscillator is oscillating has changed since the last time the frequency of said local oscillator was counted (178; FIG. 10; p. 19, ll. 30-32);

4) if the frequency of said local oscillator has not changed since the last time it was checked, return to step 2, but if the frequency of said local oscillator has changed since the last time it was checked, using the frequency of said local oscillator to determine the channel to which said TVR is tuned and then learn the return loss ratio signature of said TV channel to which said TVR is tuned and store said signature in memory (180; FIG. 10; p. 20; ll. 3-17);

5) determine if there is a match between the signature stored in step 4 and signatures previously stored (FIG. 10; p. 20; ll. 3-17);

6) if step 5 determines there is a match, generating and sending the appropriate commands to control a set top decoder to tune to a downstream channel carrying the TV channel

determined in step 5 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 5 with said television signal (FIG. 10; p. 20; ll. 3-17),

7) determining if all signatures for all channels have been learned, and, if so, thereafter using said signatures in conjunction with return loss ratio measurements on a plurality of probe signals to determine the channel to which a TVR is tuned at any particular time, but if not all signatures have been learned, returning to step 2 (FIG. 10; p. 20; ll. 3-17);

8) if step 5 determines that the signature learned in step 4 does not match any signature previously learned, labeling the signature data gathered in step 4 as the signature for the channel determined in step 4, and then returning to step 2 (FIG. 10; p. 20; ll. 3-17).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-4, 13-15 and 18-19 are anticipated under 35 U.S.C. §102(b) by U.S. Pat. No. 5,404,161 (Douglass et al; hereinafter, "Douglass").

Whether claims 5-6 are unpatentable under 35 U.S.C. §103(a) over Douglass in view of U.S. Pat. No. 5,857,003 (Geiger et al; hereinafter, "Geiger").

Whether claim 20 is unpatentable under 35 U.S.C. §103(a) over Douglass in view of U.S. Pat. No. 6,208,799 (Marsh et al; hereinafter, "Marsh").

Whether claims 21-22 are unpatentable under 35 U.S.C. §103(a) over Douglass in view of U.S. Pat. No. 6,130,726 (Darbee et al; hereinafter, "Darbee").

ARGUMENT

Rejection of Claims 1-4, 13-15 and 18-19 Under 35 U.S.C. § 102(b)

Claims 1-4

Claim 1 recites, *inter alia*,

> a transmitter for generating probe signals; and
> a receiver for receiving reflected probe signals and calculating a return loss ratio therefrom.

These features are not disclosed in Douglass. Even though Douglass is directed to a technology for determining a channel to which a TV is tuned, Douglass implements this by detecting the TV's local oscillator signal from a cable which feeds a radio frequency signal to the TV in the conventional manner described in the Background section of Appellant's specification. In addition to this or alternatively, Douglass measures return loss in reflected picture carrier signals by comparing input and reflected picture carrier signals. This implementation is described in column 8, line 48 through column 9, line 41 of Douglass, and essentially uses switch 124 to effect a comparison between the incoming signal from source 108 with the reflected signal from TV 102 for each channel and to compile a profile of these reflections for all frequencies. The return loss profile consists of a value representing a reflected picture carrier signal strength measurement for each possible tuned channel.

Importantly, in Douglass there is no issuance of a probe signal or detection of a reflection thereof to determine return loss and infer channel selection. While Douglass measures return loss, the signal whose loss is measured is the radio frequency source signal 108, not a probe signal specifically generated for that purpose. Thus Douglass does not disclose, from claim 1, "a directional coupler … having a transmit input for receiving probe signals and a transmit output at which appears probe signals reflected from said TVR," "a multiplexer … having a second input for receiving probe signals," "a transmitter for generating probe signals," and "a receiver for receiving reflected probe signals."

Appellant respectfully disagrees with the reasoning to the contrary in the Office Action, including for instance the statement in item 4, page 5 of the Final Office Action that "Douglass discloses a transmitter for generating probe signals." The cited component and passage in Douglass instead relate to coarse tune voltage source presenting a voltage to a voltage controlled oscillator, and these cannot be equated with a probe signal sent by a transmitter and received in reflected form by a receiver as claim 1 recites. The claimed probe signals, comprising a plurality of independent sinusoidal signals generated in a digital-to-analog (DAC) converter, are used to probe the return loss of every channel during a training process in the presently claimed invention. This is explained in detail in for example page 5, line 31 to page 6, line 1 and page 22, lines 6-8 of the specification. In contrast, Douglass' coarse voltage source presents a voltage to the VCO in order to place a selected signal output from the mixer in the vicinity of a bandpass filter. (See Douglass, col. 11 , lines 7-8.) Thus, Douglass fails to disclose generating probe signals for probing return loss of every channel during a training process.

It will be appreciated that a claim is anticipated under 35 U.S.C. §102 only if each and every claim element is found, either expressly or inherently described, in a single prior art reference.[1] The aforementioned reasons clearly indicate the contrary, and reversal of the 35 U.S.C. §102 rejection based on Douglass is respectfully urged.

Claims 13-15

Claim 13 recites, *inter alia*,

> (1) generating one or more probe signals …;
> (2) transmitting said probe signals to an RF tuner input of said TVR and coupling reflected power back to an input of a receiver;
> (3)…calculating a return loss ratio and determining therefrom whether said TVR is tuned to said particular TV channel

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[1] Manual of Patent Examining Procedure (MPEP) § 2131. See also *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Douglass fails to disclose, from claim 13, "generating one or more probe signals having frequencies within the passband or some of which are within and some of which are without the passband of a tunable bandpass filter within a tuner of a TVR when said TVR is tuned to a particular TV channel." In fact Douglass does not show any components of the TV 102 and makes no mention of a tunable bandpass filte thereof. Douglass also does not disclose "transmitting … probe signals to an RF tuner input of [a] TVR and coupling reflected power back to an input of a receiver." The Office Action alleges that controller 200 forwards signals to TV 102 and detects reflected signals.[2] This assertion is in fact incorrect and there is no disclosure in Douglass of controller forwarding signals to TV 102. The discussion in column 8, lines 4-38 in Douglass to which the Office Action makes reference relates to detection of vertical synchronization in order to determine the correct sampling intervals and makes no mention of controller 200 forwarding signals to the TV 102 and detecting reflected signals.

Claim 18

Claim 18 recites, inter alia,

> …
> 2) generating and transmitting into an RF input of said TVR a plurality of probe signals having frequencies spread through a band of frequencies in which TV channels are transmitted;
> 3) determining the transmitted power of each probe signal;
> 4) measuring the reflected power of each probe signal;
> 5) calculating the return loss ratio for each probe signal;
> 6) determining the probe signal with the maximum return loss;
> 7) determine the TV channel whose frequency has the best match with the probe signal which suffered the highest return loss; …

As explained above, in Douglass, no probe signal is used; rather, return loss measurement is based on how much of the signal from radio frequency source 108 is reflected back by the TV 102. Therefore none of the above features of claim 18 are disclosed.

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[2] Final Office Action, item 4, p. 5.

Claim 18 also recites,

> …
>
> 10) if step 8 determines the TV channels are the same, use the TV channel determined in steps 7 and 1 and generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel determined in step 7 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 7 with said television signal.

The Office Action appears to equate Appellant's "if step 8 determines the TV channels are different/same, use the TV channel determined in step 7" to Douglass' verifying if a channel detected with one test with another test to ensure proper detection. However, claim 18 further recites "and generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel determined in step 7…: This feature is not disclosed Douglass.

Claims 19

Claim 19 recites, inter alia,

> 1) performing a setup process to learn the signature of each TV channel comprised of the return loss ratios of a plurality of probe signals which have frequencies spread throughout the TV channel band, and storing the signature for each TV channel;

These features are equated in the Office Action with Douglass' creating a profile of return loss characteristics consisting of a value representing a reflected picture carrier signal strength. As explained in Appellant's specification on page 14, lines 19-31, a signature of a particular channel is a collection of the return losses at each of a plurality of probe frequencies while the TVR is tuned to that channel. Because the characteristics of the bandpass filter in each tuner for each selected channel are unique, each selected channel has a unique return loss power magnitude or signature. The unique signatures for example, are used to solve the problem of ambiguity created by multiple frequency components having low reflected power that span more than one channel. See Appellant's specification, page 5, lines 26-33. In contrast, in Douglass, the profile of return loss characteristics is created based on tuning the TV to each possible channel and storing a value representing a signal strength of a reflected picture carrier signal. Thus, Appellant's feature of learning a signature of each TV channel comprising of return loss ratios of a plurality of probe signals is missing from Douglass.

Claim 19 further recites

> …
>
> 3) generating a plurality of probe signals having frequencies which are spread through the band of frequencies in which TV channels are transmitted and transmitting said probe signals into the RF input of a tuner of a TVR;
>
> 4) calculating the return loss ratio on each probe signal;

As explained above, Douglass does not use probe signals to measure return loss, and these features of claim 19 are therefore not disclosed in Douglass.

Claim 19 further recites "comparing the collection of return loss ratios to the signature stored in memory." The Office Action specifically refers to Douglass' calculating return loss ratios and looking for a match with the profiles in a "learned" table as being analogous to this feature. According to Applicant's claim 19, a plurality of probe signals are generated and transmitted to a tuner of a TVR. A return loss is calculated on each probe signal and the calculated return loss is compared to the signature stored in memory. The signature is created as discussed above. The TV channel having the least difference between the return loss ratio and the signature is determined as the channel to which the TVR is tuned. In contrast, in Douglass, a return loss ratio is compared with a profile which is created based on signal strength of a reflected picture carrier signal.

Rejection of Claims 5-6 Under 35 U.S.C. §103(a)

Claims 5-6

Claim 5 specifies that the transmitter of claim 1 includes a probe signal generator comprised of first and second clocks, a multiplexer, and a D/A converter configured in the specific manner. As previously explained, Douglass does not show a transmitter that generates a probe signal, and this deficiency is not cured by Geiger because Geiger also does not show generation and transmission of probe signals. The details of the transmitter set forth in claim 5 are also not disclosed in either Douglass or Geiger. The allegation that the coarse and fine tunes of Douglass equate to the two clocks is untenable.

Claim 6 specifies that the transmitter of claim 1 includes a variable frequency clock and a D/A converter configured in a specific manner. Douglass does not show a transmitter that generates a probe signal, and this deficiency is not cured by Geiger because Geiger also does not show generation and transmission of probe signals.

Further, by virtue of their dependency, claims 5-6 depend include all the limitations of independent claim 1 and are patentable over the combination of Douglass and Gieger for the same reasons set forth above.

Rejection of Claim 20 Under 35 U.S.C. §103(a)

Claim 20

Regarding claim 20, the Office Action appears to equate Appellant's "store the collection of return loss ratios as a signature for the TV channel to which the TVR is currently tuned" with Douglass' creating a profile of return loss characteristics consisting of a value representing a reflected picture carrier signal strength. As explained in Appellant's specification on page 14, lines 19-31, a signature of a particular channel is a collection of the return losses at each of a plurality of probe frequencies while the TVR is tuned to that channel. Because the characteristics of bandpass filter in each tuner for each selected channel are unique, each selected channel has a unique return loss power magnitude or signature. The unique signatures for example, are used to solve the problem of ambiguity created by multiple frequency components having low reflected power that span more than one channel. See Appellant's specification, page 5, lines 26-33. In contrast, in Douglass, the profile of return loss characteristics is created based on tuning the TV to each possible channel and storing a value representing a signal strength of a reflected picture carrier signal. Thus, Appellant's feature of learning a signature of each TV channel comprising of return loss ratios of a plurality of probe signals is missing from Douglass.

Claim 20 is also patentable over Douglass and Marsh by virtue of its recitation of the probe signal generation and measurement approach, explained above. This approach is not disclosed or suggested by Douglass, and this deficiency is not cured by Marsh.

Rejection of Claims 21-22 Under 35 U.S.C. §103(a)

Claims 21-22

As mentioned above, Appellant respectfully submits that Douglass does not disclose "[a transmitter for] generating [and transmitting] probe signals," "calculating the return loss ratio for each probe signal," "generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel," "performing a setup process to learn the signature of each TV channel comprised of the return loss ratios of a plurality of probe signals," and "comparing the collection of return loss ratios to the signature stored in memory." As explained above, Douglass does not teach or suggest such features. Darbee is not believed to disclose such and the Office action does not appear to rely on Darbee for such. Accordingly, the combination of Douglass with Darbee also fails to disclose Applicant's claimed invention.

CLAIMS APPENDIX

1. A return loss channel detector apparatus comprising:

a directional coupler having an RF output for coupling to an RF input of an analog television or analog video tape recorder (hereafter TVR) and having a transmit input for receiving probe signals and a transmit output at which appears probe signals reflected from said TVR;

a multiplexer having an output coupled to said transmit input and having a first input for receiving a radio frequency carrier having a video signal modulated thereon and having a second input for receiving probe signals;

a transmitter for generating probe signals; and

a receiver for receiving reflected probe signals and calculating a return loss ratio therefrom.

2. The apparatus of claim 1 wherein said transmitter includes means for generating probe signals that have frequencies spread out through a band of frequencies in which TV channels are transmitted.

3. The apparatus of claim 2 wherein said receiver includes means for calculating return loss ratios for all probe signals generated by said transmitter and storing the calculated return loss ratios for each probe signal as a signature for a TV channel to which said TVR is tuned.

4. The apparatus of claim 3 wherein said transmitter further comprises means for calculating a calibration coefficient for each probe signal, and wherein said means for calculating return loss ratios for said probe signal includes means for using the calibration coefficient for each probe signal in making the return loss ratio calculation for said probe signal.

5. The apparatus of claim 1 wherein said transmitter includes a probe signal generator comprising:

a first clock for generating a first sample frequency and having a clock signal output;

a second clock for generating a second sample frequency which is different than said first sample frequency and having a clock signal output;

a multiplexer having first and second inputs coupled to said outputs of said first and second clocks, respectively, and having an output;

a digital to analog converter (D/A) having a sampling clock signal input coupled to said output of said multiplexer and having a digital signal input and having an output for coupling to said transmit input of said directional coupler, said D/A using a zero order hold process to construct an analog signal from a digital signal representation received at said digital signal input, a direct digital synthesizer having a digital signal output coupled to said digital signal input of said D/A and having a control word input for receiving a control word which controls the frequency of the signal represented digitally by data output on said digital signal output.

6. The apparatus of claim 1 wherein said transmitter includes a probe signal generator comprising:

a variable frequency clock having a frequency control input and having an output at which a sampling clock signal having a frequency established by a signal received at said frequency control input;

a digital to analog converter (D/A) having a sampling clock signal input coupled to said output of said variable frequency clock, and having a digital signal input and having an output for coupling to said transmit input of said directional coupler, said D/A using a zero order hold process to construct an analog signal from a digital signal representation received at said digital signal input, a direct digital synthesizer having a digital signal output coupled to said digital signal input of said~ D/A and having a control word input for receiving a control word which controls the frequency of the signal represented digitally by data output on said digital signal output.

13. A process for determining if an analog TV or VCR (hereafter TVR) is tuned to a particular TV channel, comprising the steps:

(1) generating one or more probe signals having frequencies within the passband or some of which are within and some of which are without the passband of a tunable bandpass filter within a tuner of a TVR when said TVR is tuned to a particular TV channel;

(2) transmitting said probe signals to an RF tuner input of said TVR and coupling reflected power back to an input of a receiver;

(3) in said receiver calculating a return loss ratio and determining therefrom whether said TVR is tuned to said particular TV channel.

14. The process of claim 13 wherein step 1 comprises generating a plurality of probe signals having frequencies that are spread throughout the entire TV channel band, and wherein step 2 comprises transmitting a plurality of probe signals to said TVR simultaneously, and wherein step 3 comprises setting the filter coefficients for each of a purality of bandpass filters in said receiver such that said bandpass filter has a passband which encompasses the frequency at which a different one of said probe signals appears at the input to said bandpass filter, and calculating a return loss ratio on the output signal from each said bandpass filter.

15. The process of claim 14 further comprising the step of calculating a calibration coefficient for each probe signal frequency and using said calibration coefficient for each probe signal frequency in a calculation of a return loss ratio for said probe signal to compensate for frequency dependent variations that affect the probe signals.

18. A process for using return loss to verify a TV channel to which a TVR is tuned, comprising the steps:

1) detecting a local oscillator leakage signal and counting the frequency thereof and using said frequency to lookup a TV channel to which a TVR is tuned which would cause said local oscillator to have said frequency;

2) generating and transmitting into an RF input of said TVR a plurality of probe signals having frequencies spread through a band of frequencies in which TV channels are transmitted;

3) determining the transmitted power of each probe signal;

4) measuring the reflected power of each probe signal;

5) calculating the return loss ratio for each probe signal;

6) determining the probe signal with the maximum return loss;

7) determine the TV channel whose frequency has the best match with the probe signal which suffered the highest return loss;

8) determining if the TV channel determined in step 7 is the same as the TV channel determined in step 1;

9) if step 8 determines the TV channels are different, use the TV channel determined in step 7 and generate suitable control signals for use by a set top decoder
to tune to a downstream channel carrying the TV channel determined in step 7 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 7 with said television signal;

10) if step 8 determines the TV channels are the same, use the TV channel determined in steps 7 and 1 and generate suitable control signals for use by a set top decoder to tune to a downstream channel carrying the TV channel determined in step 7 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 7 with said television signal.

19. A process for using return loss to determine a TV channel to which a TVR is tuned, comprising the steps:

1) performing a setup process to learn the signature of each TV channel comprised of the return loss ratios of a plurality of probe signals which have frequencies spread throughout the TV channel band, and storing the signature for each TV channel;

2) determing the TV channel to which a TVR is currently tuned by performing the following steps:

3) generating a plurality of probe signals having frequencies which are spread through the band of frequencies in which TV channels are transmitted and transmitting said probe signals into the RF input of a tuner of a TVR;

4) calculating the return loss ratio on each probe signal;

5) comparing the collection of return loss ratios and comparing the collection of return loss ratios to the signature stored in memory for each TV channel and determining the TV channel have the least difference between its signature and said collection of return loss ratios calculated in step 4; and

6) generating suitable control signals to control a set top decoder to tune to a downstream channel carrying the TV channel determined in step 5 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 5 with said television signal.

20. A setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) establishing the proper infrared protocol for at least channel change commands to be emitted from an infrared transmitter;

2) entering a learning mode;

3) transmitting a channel change command from said infrared transmitter to cause a TVR connected to a set top decoder with a return loss ratio channel detection circuit therein to tune to a specific channel;

4) controlling said return loss ratio channel detection circuit to generate a plurality of probe signals and transmit them into the RF input of a tuner in said TVR;

5) measure the reflected amplitude of each said probe signal and calculate a return loss ratio therefor and store the collection of return loss ratios as a signature for the TV channel to which the TVR is currently tuned;

6) transmitting channel change command from said infrared transmitter to cause said TVR to change to a new channel;

7) repeating steps 4 and 5 for the new channel;

8) repeating steps 6 and 7 until a signature has been learned for every TV channel.

21. A setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) establishing the proper infrared protocol for at least channel change commands to be emitted from an infrared transmitter in an external remote control for a set top decoder (STB), said external remote control including an RF transmitter for communicating with an RF receiver in said STB, said STB including a return loss ratio channel detection circuit therein having an RF output for coupling to the RF input of a tuner of a TVR;

2) entering a learning mode;

3) transmitting a channel change command from said infrared transmitter in said external remote control to cause said TVR connected to said return loss ratio channel detection circuit to tune to a specific channel, and sending a radio frequency message to said STB telling said STB to which TV channel said TVR has just been tuned;

4) controlling said return loss ratio channel detection circuit to generate a plurality of probe signals and transmit them into said RF input of said tuner in said
TVR;

5) measuring the reflected amplitude of each said probe signal and calculate a return loss ratio therefor and store the collection of return loss ratios as a signature for the TV channel to which the TVR is currently tuned;

6) transmitting channel change command from said infrared transmitter in said external remote control to cause said TVR to change to a new channel;

7) repeating steps 4 and 5 for the new channel;

8) repeating steps 6 and 7 until a signature has been learned for every TV channel.

22. A setup process for learning the return loss ratio signature of each TV channel comprising steps for:

1) transmitting a channel change command to a TVR using a remote control of said TVR so as to tune said TVR to a selected TV channel;

2) periodically or occasionally monitoring leakage from a local oscillator in a tuner of said TVR to determine the frequency at which said local oscillator is oscillating;

3) determining if the current frequency at which said local oscillator is oscillating has changed since the last time the frequency of said local oscillator was counted;

4) if the frequency of said local oscillator has not changed since the last time it was checked, return to step 2, but if the frequency of said local oscillator has changed since the last time it was checked, using the frequency of said local oscillator to determine the channel to which said TVR is tuned and then learn the return loss ratio signature of said TV channel to which said TVR is tuned and store said signature in memory;

5) determine if there is a match between the signature stored in step 4 and signatures previously stored;

6) if step 5 determines there is a match, generating and sending the appropriate commands to control a set top decoder to tune to a downstream channel carrying the TV channel determined in step 5 and recover the data thereof and convert said data to a television signal and modulate an RF carrier having the frequency of the TV channel determined in step 5 with said television signal,

7) determining if all signatures for all channels have been learned, and, if so, thereafter using said signatures in conjunction with return loss ratio measurements on a plurality of probe signals to determine the channel to which a TVR is tuned at any particular time, but if not all signatures have been learned, returning to step 2;

8) if step 5 determines that the signature learned in step 4 does not match any signature previously learned, labeling the signature data gathered in step 4 as the signature for the channel determined in step 4, and then returning to step 2.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.

Please charge any additional required fee or credit any overpayment not otherwise paid or credited to our deposit account No. 50-3557.

Respectfully submitted,
NIXON PEABODY LLP

Dated: January 28, 2009

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